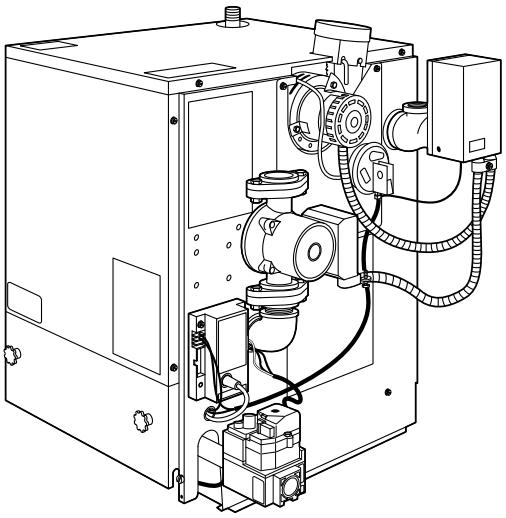
Installation, Start-Up, and Operating Instructions

Gas-Fired
Induced-Draft Hot Water Boilers
Sizes 42,500 thru 225,000
Series A

BW3

NOTE: Read the entire instruction manual before starting the installation. These instructions must be affixed on or adjacent to the boiler.

MODEL BW3



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SAFETY CONSIDERATIONS

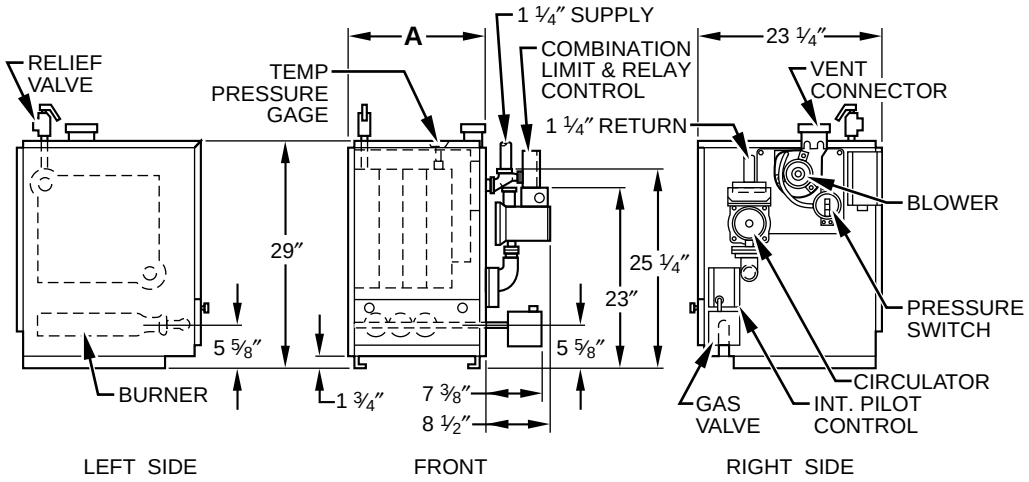
Installing and servicing heating equipment can be hazardous due to gas and electrical components. Only trained and qualified personnel should install, repair, or service heating equipment. Untrained personnel can perform basic maintenance functions such as maintaining water level. All other operations must be performed by trained service personnel. When working on heating equipment, observe precautions in literature, on tags, and on labels attached to or shipped with unit and other safety precautions that may apply.

Follow all safety codes. In the United States, follow all safety codes including the National Fuel Gas Code (NFGC) NFPA No. 54-1992/ANSI Z223.1-1992. In Canada, refer to the current edition of the National Standard of Canada CAN/CGA-B149.1- and .2-M91 Natural Gas and Propane Installation Codes (NSCNGPIC). Wear safety glasses and work gloves. Have fire extinguisher available during start-up and adjustment procedures and service calls.

Recognize safety information. This is the safety-alert symbol ⚠ . When you see this symbol on unit or in instructions and manuals, be alert to potential for personal injury.

Understand the signal words DANGER, WARNING, and CAUTION. These words are used with safety-alert symbol. DANGER identifies most serious hazards which **will** result in severe personal injury or death. WARNING signifies hazards which **could** result in personal injury or death. CAUTION is used to identify unsafe practices which **would** result in minor personal injury or product and property damage. NOTE is used to highlight suggestions which **will** result in enhanced installation, reliability, or operation.

BOILER RATINGS AND CAPACITIES



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Gas-Fired Hot Water Boilers

BOILER MODEL NUMBER*	NO. OF SECTIONS	NATURAL AND PROPANE GAS†			DIMENSIONS (IN.)	
		A.G.A. Input MBH	Heating Capacity MBH	Net I=B=R Rating MBH	Width A	Vent Diameter To Chimney (Category I)
BW3AA-000042AAAA	2	42.5	36	31	11	4
BW3AA-000075AAAA	3	75.0	63	55	14-1/4	4
BW3AA-000112AAAA	4	112.5	94	82	17-1/2	4
BW3AA-000150AAAA	5	150.0	125	109	20-3/4	4
BW3AA-000187AAAA	6	187.5	155	135	24	4
BW3AA-000225AAAA	7	225.0	186	162	27-1/4	4

* Sixth position of Model No. indicates natural or propane gas usage: N = Natural Gas
P = Propane Gas

† Boilers are equipped for altitudes up to 2000 ft only. For altitudes above 2000 ft, ratings should be reduced at the rate of 4% for each 1000 ft above sea level. Heating Capacity is based on Department of Energy (D.O.E.) test procedure.

MBH—1000 Btuh

Btuh—British Thermal Unit Per Hour

Fig. 1—Dimensional Drawing and Boiler Ratings and Capacities

The ratings marked "Net I=B=R Rating" indicate the amount of radiation each boiler will take care of under normal conditions and thermostatic control. The Net I=B=R Ratings shown are based on an allowance of 1.15 in accordance with the factors in the I=B=R Standard as published by The Hydronics Institute.

Selection of boiler size should be based upon "Net I=B=R Rating" being equal to or greater than calculated heat loss of building.

Consult manufacturer before selecting a boiler for installations having unusual piping and pickup requirements.

These boilers must stand on a non-combustible floor. If installed on a combustible floor, a factory-approved combustible floor base must be used.

Specifications and dimensions are subject to change without notice.

BOILERS FOR USE AT HIGH ALTITUDE

This boiler is factory equipped for use at altitudes of 0-2000 ft above sea level. For use at altitudes above 2000 ft above sea level, input ratings are reduced by a change in main burner orifice size.

For altitudes above 2000 ft above sea level, input ratings should be reduced at the rate of 4% for each 1000 ft above sea level. Consult the NFGC NFPA 54/ANSI Z223.1-1992 or the manufacturer for correct orifice sizing. High-altitude orifices are available from boiler manufacturer.

INTRODUCTION

This boiler cannot be used with all types of chimneys. Read these instructions carefully before installing.

These Gas-Fired Hot Water Boilers are low-pressure, sectional cast iron boilers design certified by the American Gas Association (A.G.A.) for use with natural and propane gases. They are constructed and hydrostatically tested for a maximum working pressure of 50 psi in accordance with the American Society of Mechanical Engineers (A.S.M.E.) Boiler and Pressure Vessel Code Section IV Standards for cast iron heating boilers.

Check to be sure boiler size is correct before starting installation. See rating and capacity table shown in Fig. 1. Also be sure new boiler is for the type of gas being used. Check rating plate on right side of boiler.

The boiler must be supplied with correct type of gas, fresh air for combustion, and a suitable electrical supply. Boiler must also be connected to a suitable venting system and an adequate piping system. Finally, a properly located thermostat is needed for control of heating system. If there are any doubts as to the various requirements, check with local authorities and obtain professional help where needed. Take time to complete all the steps for SAFE and PROPER operation of heating system.

Where required by authority having jurisdiction, the installation must conform to American Society of Mechanical Engineers Safety Code for Controls and Safety Devices for Automatically Fired Boilers, No. CSD-1.

Before installing the boiler in the United States, refer to the current edition of the NFGC. For further information, the NFGC is available from National Fire Protection Association Inc., Batterymarch Park, Quincy, MA 02269; American Gas Association, 1515 Wilson Boulevard, Arlington, VA 22209; or from Literature Distribution.

Before installing the boiler in Canada, refer to the current edition of the NSCNGPIC. Contact Standards Department of Canadian Gas Association, 55 Scarsdale Road, Don Mills, Ontario, Canada M3B 2R3.

The installation must conform with requirements of the authority having jurisdiction, or in absence of local codes, to the NFGC.

The following steps are all necessary for proper installation and safe operation of boiler.

1. LOCATING THE BOILER
2. FRESH AIR FOR COMBUSTION
3. INSTALLATION—SYSTEM PIPING
4. CHIMNEY AND VENT PIPE CONNECTION
5. GAS SUPPLY PIPING
6. ELECTRICAL WIRING
7. CHECKING AND ADJUSTING

⚠ WARNING: Keep boiler area clean and free from combustible materials, gasoline, and other flammable vapors and liquids.

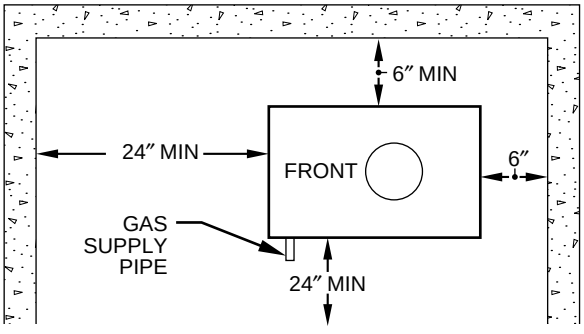
⚠ WARNING: Improper installation, adjustment, alteration, service, or maintenance can cause injury or property damage. Refer to this manual. For assistance or additional information, consult a qualified installer, service agency, or the gas supplier. Natural gas boilers are not to be converted to propane gas.

LOCATING THE BOILER

If boiler is part of a planned heating system, locate it where shown on plan. If boiler is to be part of an existing system, it is usually best to put it where the old one was. If location is to be changed, additional materials may be required as well as an adequate base. The following rules apply:

1. The boiler must be level. Metal shims may be used under base legs for final leveling.
2. Use a raised base if floor can become wet or damp.
3. The vent pipe connection should be as short as possible.
4. ACCESSIBILITY CLEARANCES MUST TAKE PRECEDENCE OVER FIRE PROTECTION CLEARANCES.

   An 18-in. clearance must be maintained at a side where passage is required to access another side for cleaning or servicing, inspection, or replacement of any parts that normally may require such attention. Allow at least 24-in. front and right side clearance for servicing. Allow at least 6-in. clearance from combustible materials on all sides and top. (See. Fig. 2.)



THIS UNIT MUST BE SET ON A CONCRETE OR OTHER NON-COMBUSTIBLE MATERIAL BASE OR FLOOR.

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Fig. 2—Minimum Clearance Dimensions

5. Equipment shall be installed in a location in which the facilities for ventilation permit satisfactory combustion of gas, proper venting, and maintenance of ambient temperature at safe limits under normal conditions of use. Equipment shall be located so as not to interfere with proper circulation of air. When normal infiltration does not provide necessary air, outside air shall be introduced as described in Fresh Air for Combustion section.
6. Advise owner to keep air passages free of obstructions. Ventilation and combustion air must enter boiler room without restrictions.

7. The floor supporting boiler must be non-combustible. If it is combustible, place the boiler on a factory-approved combustible floor base. We use a 2-in. cladite™ pad as a combustible floor base. These are available from your local supplier. Use a minimum 24-in. X 30-in. pad for 2-5 section boilers and a minimum 30-in. X 30-in. pad for 6-7 section boilers. The boiler must be centered on combustible floor base.
8. The boiler shall be installed such that the automatic gas ignition system components are protected from water (dripping, spraying, rain , etc.) during appliance operation and service (circulator replacement, control replacement, etc.).

FRESH AIR FOR COMBUSTION

Provision for combustion and ventilation air must be in accordance with Section 5.3, Air for Combustion and Ventilation, of the NFGC, ANSI Z223.1-1992, or applicable provisions of local building codes.

Canadian installations must be installed in accordance with NSCNGPIC and all authorities having jurisdiction.

⚠ WARNING: Be sure to provide enough fresh air for combustion. Enough air ensures proper combustion and ASSURES THAT NO HAZARD WILL DEVELOP DUE TO LACK OF OXYGEN.

⚠ CAUTION: Air for combustion must not be contaminated by halogen compounds, which include fluoride, chloride, bromide, and iodide. These elements are found in aerosol sprays, detergents, bleaches, cleaning solvents, salts, air fresheners, and other household products.
Excessive exposure to contaminated combustion air will result in safety and performance related problems.

⚠ CAUTION: If a fireplace or a kitchen or bathroom exhaust fan is used, an outside air intake should be installed. These devices rob the boiler and water heater of combustion air.

Enough fresh air must be provided to assure proper combustion. The fire in the boiler uses oxygen. It must have a continuous supply. The air in a house contains only enough oxygen to supply the burner for a short time. Outside air must enter the house to replace that used by the burner. The exact fresh air requirements depend on whether the boiler is located in an unconfined or confined space.

PROCEDURE 1—BOILER LOCATED IN UNCONFINED SPACE

An unconfined space is defined as a space whose volume is not less than 50 cu ft per 1000 Btuh of total input rating of all appliances installed in that space.

If boiler is in an open area (unpartitioned basement) in a conventional house, air that leaks through cracks around doors and windows will usually be adequate to provide air for combustion. The doors should not fit tightly. Do not caulk cracks around windows.

PROCEDURE 2—BOILER LOCATED IN CONFINED SPACE

A. All Air From Inside Building

The confined space shall be provided with 2 permanent openings communicating directly with an additional room(s) of sufficient volume so that the combined volume of all spaces meets the criteria for an unconfined space. The total input of all gas utilization equipment installed in the combined space shall be considered in making this determination. Each opening shall have a minimum free area of 1 sq in. per 1000 Btuh of total input rating for all gas utilization equipment in the confined space, but not less than 100 sq in. One opening shall be within 12 in. of the top and 1 within 12 in. of the bottom of the enclosure.

B. All Air From Outdoors

The confined space shall be provided with 2 permanent openings, 1 commencing within 12 in. of the top and 1 commencing within 12 in. of the bottom of the enclosure. The openings shall communicate directly, or by ducts, with the outdoors or spaces (crawl or attic) that freely communicate with the outdoors.

1. When directly communicating with the outdoors, each opening shall have a minimum free area of 1 sq in. per 4000 Btuh of total input rating for all equipment in the enclosure.
2. When communicating with the outdoors through vertical ducts, each opening shall have a minimum free area of 1 sq in. per 4000 Btuh of total input rating for all equipment in the enclosure.
3. When communicating with the outdoors through horizontal ducts, each opening shall have a minimum free area of 1 sq in. per 2000 Btuh of total input rating for all equipment in the enclosure.
4. When ducts are used, they shall be of the same cross-sectional area as the free area of the openings to which they connect. The minimum dimension of rectangular air ducts shall not be less than 3 in.

EXCEPTION—If this INDUCED DRAFT boiler is the ONE AND ONLY gas-fired appliance in the confined space, then each required ventilation opening as determined above may be reduced by 1/2.

For Example:

VENTILATION OPENING REQUIREMENT		
All Air from Inside Building	1 sq in. per 2000 Btuh, but not less than 50 sq in.	
All Air from Outside Building	Direct Communication	1 sq in. per 8000 Btuh
	Vertical Ducts	1 sq in. per 8000 Btuh
	Horizontal Ducts	1 sq in. per 4000 Btuh

Table 1—Fresh Air Duct Capacities for Ducts Supplying Fresh Air to Boiler in Tightly Constructed Houses (Btuh)*

FRESH AIR DUCT SIZE (IN.)	1/4-IN. MESH SCREEN	WOOD LOUVERS	METAL LOUVERS
3 X 12	144,000	36,000	108,000
8 X 8	256,000	64,000	192,000
8 X 12	384,000	96,000	288,000
8-1/2 X 16	512,000	128,000	384,000

* Based on opening covered by 1/4-in. mesh screen, wood louvers, or metal louvers.

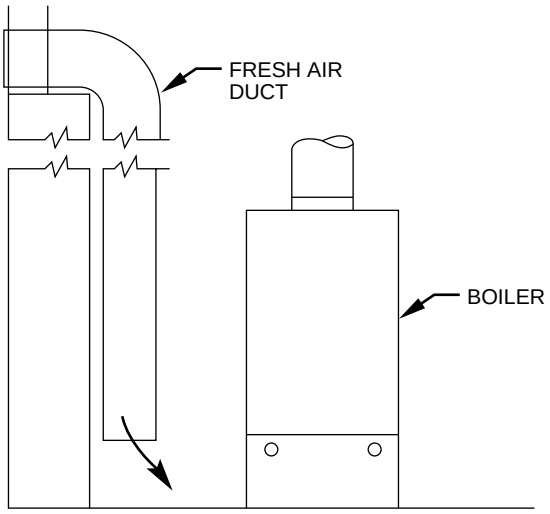

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Fig. 3—Fresh Air Duct for Tightly Sealed House

INSTALLATION—SYSTEM PIPING

1. Place boiler in selected location (as near chimney as possible). Boiler is shipped assembled. Only the relief valve with a drain line to carry any water to a drain and a drain valve need to be installed.
2. Install relief valve on 3/4-in. pipe nipple in tapped opening in left end section. Connect a drain line of same pipe size (3/4 in.) to carry any water away to a drain. No shutoff of any description shall be placed between safety relief valve and boiler, or on discharge pipes between such safety valves and the atmosphere. Installation of safety relief valve shall conform to the requirements of the ANSI/ASME Boiler and Pressure Vessel Code, Section IV.
3. Install drain valve on lower left side of boiler as marked.
4. Connect supply and return lines to boiler. The connections may require certain additional fittings and parts. (See Fig. 4 and 5.)

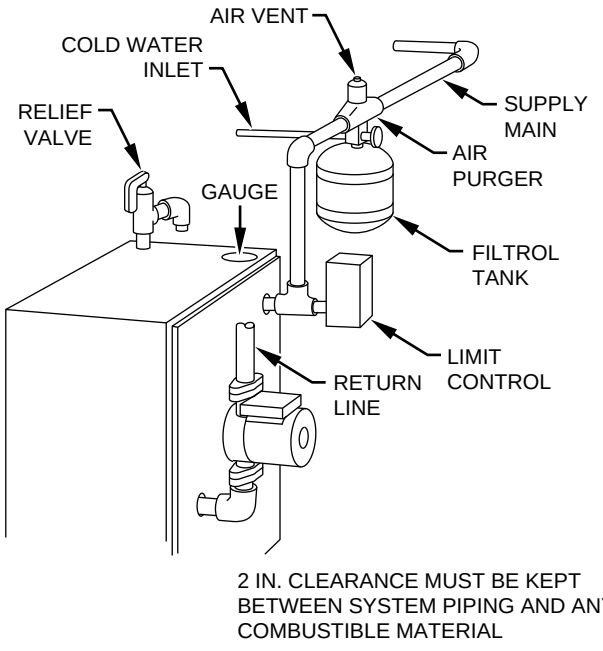

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Fig. 4—Forced Hot Water Typical Piping

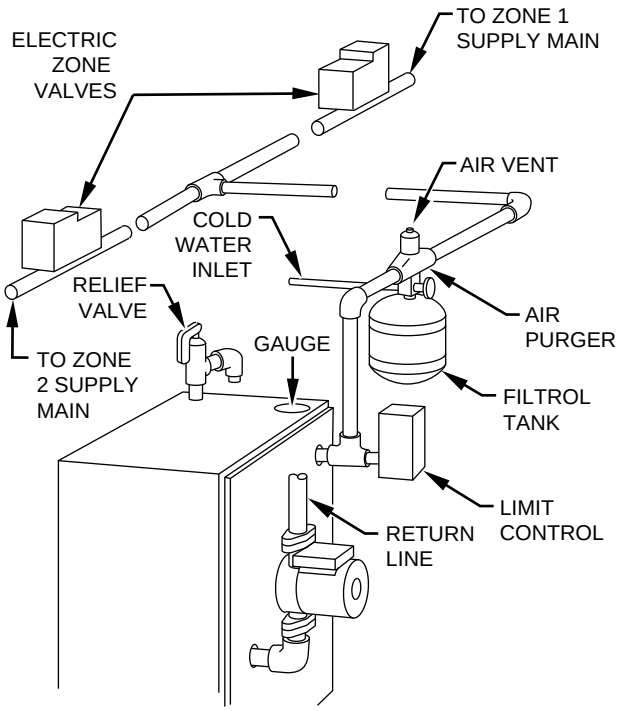

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Fig. 5—Forced Hot Water Typical Piping with Zone Control Valves

If replacing an old boiler with this new one, possibly all that will be required is to connect the existing piping to boiler and install relief valve.

If installing an entire new heating system, first install all radiation units (panels, radiators, or cabinets) and supply and return mains, then make connections at boiler.

In connecting cold water supply to water valve, make sure that a clean water supply is available. When water supply is from a well or pump, a sand strainer should be installed at pump.

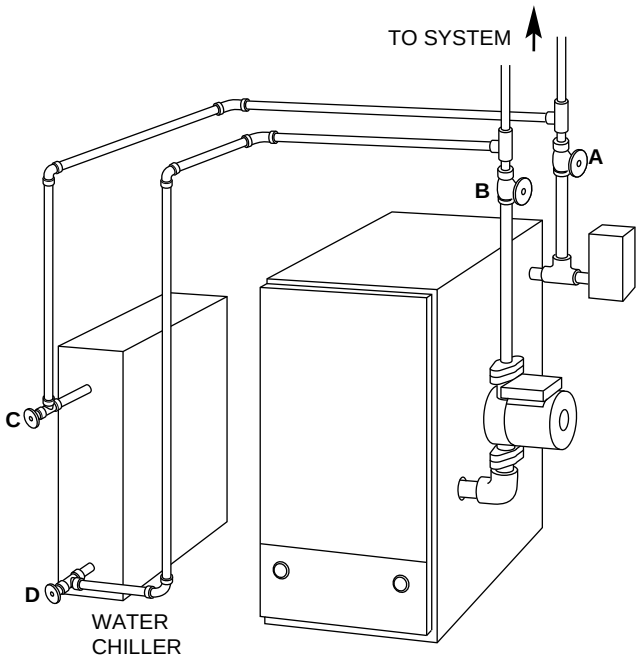

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Fig. 6—Piping Arrangements for Boiler Used in Connection with Refrigeration System

A hot water boiler installed above radiation level must be equipped with a low water cut-off device. A periodic inspection is necessary as is flushing of float-type devices per the manufacturer's specific instructions.

A 2-in. clearance must be kept between system piping and any combustible material.

PROCEDURE 1—FOR USE WITH COOLING UNITS

When this boiler is used in connection with refrigeration systems, it shall be installed so that the chilled medium is piped in parallel with the heating boiler. Appropriate valves must be used to prevent the chilled medium from entering the heating boiler. (See Fig. 6.)

When this boiler is connected to heating coils located in air handling units where they may be exposed to refrigerated air circulation, the piping system shall be equipped with flow control valves or other automatic means to prevent gravity circulation of the boiler water during cooling cycles.

PROCEDURE 2—LOW DESIGN WATER TEMPERATURE SYSTEMS (BELOW 140°F)

If boiler is to be used in a heating system where design water temperatures below 140°F are desired (for example radiant floor heating), a 3-way or 4-way mixing valve or suitable alternative is required to prevent low temperature return water from entering boiler. Follow mixing valve manufacturer's Installation Instructions.

The minimum design return water temperature to boiler to prevent condensation in boiler and venting system is 120°F. The minimum high limit setting is 140°F.

CHIMNEY AND VENT PIPE CONNECTION

For boilers for connection to gas vents or chimneys, vent installations shall be in accordance with Part 7, Venting of Equipment, of the NFGC ANSI Z223.1-1992 and applicable provisions of local building codes.

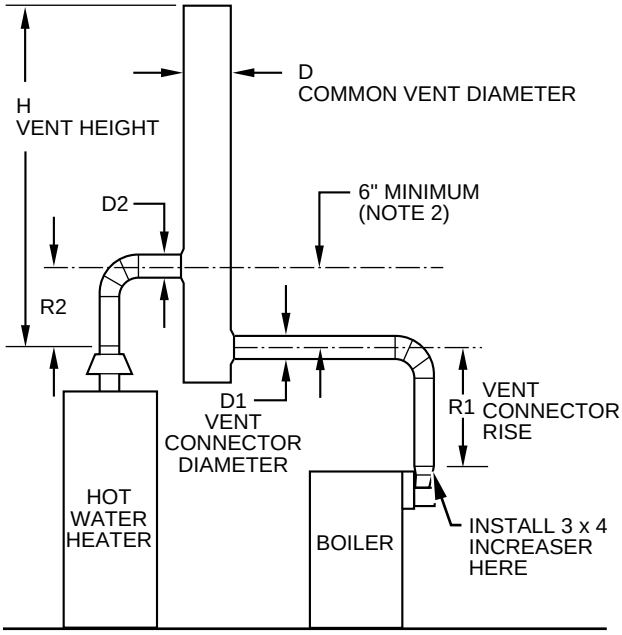
PROCEDURE 1—CHECKING CHIMNEY

This is a very important part of the heating system. It must be clean, the right size, properly constructed, and in GOOD CONDITION. No boiler can function properly with a bad chimney.

1. Use local codes for installation or NFGC Z.223.1-1992. It is very important to properly size the venting system for induced draft appliances. Consult the New Vent Sizing Tables, available from A.G.A Laboratories (American Gas Association) or Venting Tables Category I Central Furnaces, available from G.A.M.A. (Gas Appliance Manufacturers Association) or the NFGC ANSI Z223.1-1992 for correct sizing information. One of these is probably available from your local supply house, or consult the boiler manufacturer.
2. The categorized vent diameter for these boilers is 4 in. This is the minimum permissible vent diameter in order to maintain a non-positive vent static pressure. The boiler's induced draft blower has a 3-in. outlet. A 3-in. X 4-in. increaser fitting is included in the parts bag. Locate increaser fitting on outlet of induced draft blower and secure gastight with a bead of the factory-supplied silicone sealant.

NOTE: The boiler installation for chimney venting is not complete unless the 3-in. X 4-in. increaser fitting is located and secured.

3. These are high-efficiency boilers with a low stack or exhaust temperature.
4. If venting into masonry chimney without a liner, line chimney from top to bottom with either:



NOTES: 1. Consult National Fuel Gas Code or New Vent Sizing Tables (A.G.A.) or Venting Tables Category 1 Central Furnaces (G.A.M.A) for correct vent sizing information.
2. The two vent connectors entering the common vent must be at least 6" apart vertically.

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Fig. 7—Common Venting with Hot Water Heater

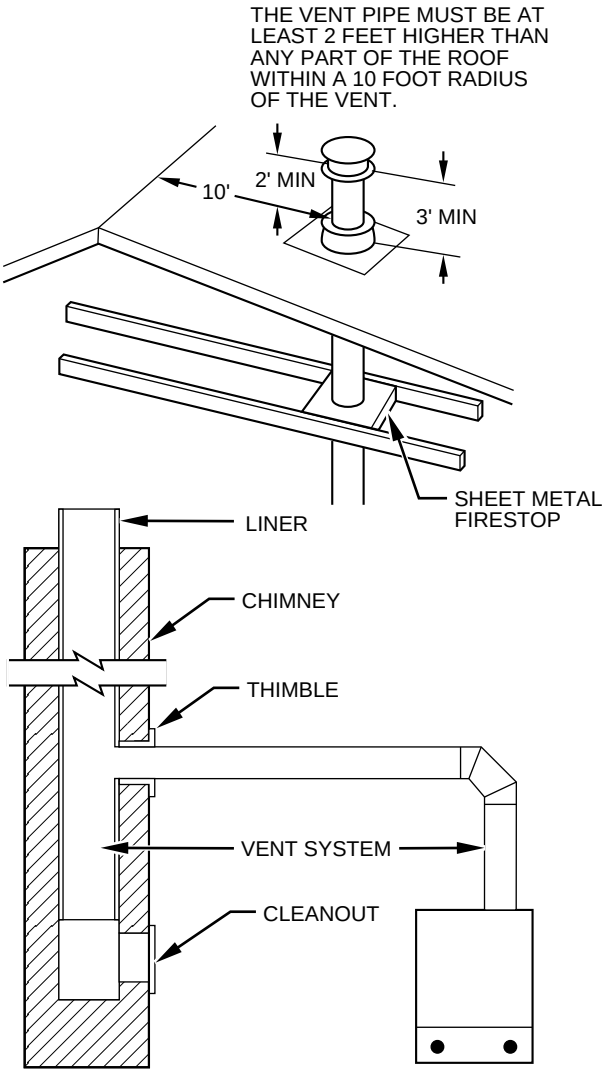

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Fig. 8—Type B Gas Vent

a. listed Type B vent pipe
b. listed flexible vent liner
c. poured ceramic liner

5. Outside chimneys should not be used unless they are either:
   a. enclosed in a chase
   b. lined with Type B vent pipe
6. The vent connector from boiler to chimney should run as directly as possible with as few elbows as possible.
7. Where possible, it is recommended to common vent water heater and boiler. Each appliance must have its own vent connector. The 2 vent connectors into chimney must be kept at least 6 in. apart. (See Fig. 7.)
8. If boiler is the only appliance connected to vent, Type B vent pipe is recommended for vent connector.
9. Slope pipe up from boiler to chimney not less than 1/4 in. per ft.
10. End of vent pipe must be flush with inside face of chimney flue. Use a sealed-in thimble for chimney connection.
11. The sections of vent pipe should be fastened with sheet metal screws to make piping rigid. Use stovepipe wires to support pipe from above.
12. Do not connect to fireplace flue.
13. Do not install a damper on this boiler.

PROCEDURE 2—MINIMUM VENT PIPE CLEARANCE

If vent pipe must go through a crawlspace, Type B vent pipe should be used. Where vent pipe passes through a combustible wall or partition, use a ventilated metal thimble. The thimble should be 4 in. larger in diameter than vent pipe.

If boiler is installed with single-wall vent, it must have a 6-in. clearance between its surface and any combustible material.

A new Type B gas vent or flexible liner must be installed in accordance with instructions furnished with vent. Maintain clearances as specified for vent pipe.

Check vent pipe to see if it is firestopped where it goes through floor or ceiling. It should have an approved vent cap with clearances from roof shown in Fig. 8. If clearances are less than shown in Fig. 8, have vent checked by local authorities.

For boilers for connection to gas vents or chimneys, vent installations shall be in accordance with Part 7, Venting of Equipment, of the NFGC ANSI Z223.1-1992 and applicable provisions of local building codes.

Vent connectors serving appliances vented by natural draft shall not be connected into any portion of mechanical draft systems operating under positive pressure.

PROCEDURE 3—REMOVING EXISTING BOILER FROM COMMON VENTING SYSTEM

When an existing boiler is removed from a common venting system, the common venting system is likely to be too large for proper venting of the appliances remaining connected to it.

At the time of removal of an existing boiler, the following items shall be followed with each appliance remaining connected to the common venting system placed in operation, while the other appliances remaining connected to the common venting system are not in operation.

1. Seal any unused openings in the common venting system.
2. Visually inspect the venting system for proper size and horizontal pitch and determine there is no blockage or restriction, leakage, corrosion, and other deficiencies which could cause an unsafe condition.
3. Insofar as is practical, close all building doors and windows and all doors between the space in which the appliances remaining connected to the common venting system are located and other spaces of the building. Turn on clothes dryers and any appliances not connected to the common venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they will operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers.
4. Place in operation the appliance being inspected. Follow the lighting instructions. Adjust thermostat so appliance will operate continuously.
5. Test for spillage at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle, or smoke from a cigarette, cigar, or pipe.
6. After it has been determined that each appliance remaining connected to the common venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers, and any other gas-burning appliance to their previous conditions of use.
7. Any improper operation of the common venting system should be corrected so the installation conforms with the NFGC ANSI Z223.1-1992. When resizing any portion of the common venting system, the common venting system should be resized to approach the minimum size as determined using the appropriate tables in Appendix G in the NFGC ANSI Z223.1-1992.

NOTE: It is recommended that existing gas vents be checked to be sure they meet local codes.

GAS SUPPLY PIPING

PROCEDURE 1—CHECKING GAS SUPPLY

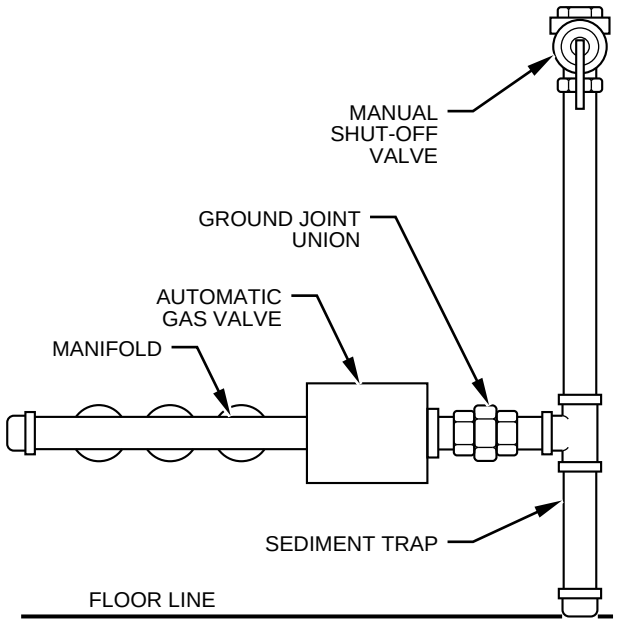
The gas pipe to boiler should run direct from gas meter (or propane regulator). It should supply only the boiler. It must be the correct size for length of run and boiler rating. See Table 2 for proper size. Be sure gas line complies with local codes and gas company requirements.

The boiler and its individual shutoff valve must be disconnected from gas supply piping system during any pressure testing of gas supply piping system at test pressures in excess of 0.5 psig (3.5 kPa).

Table 2—Gas Pipe Sizes

NATURAL GAS				
Length of Pipe (Ft)	Pipe Capacity—Btuh Input Includes Fittings			
	1/2 in.	3/4 in.	1 in.	1-1/4 in.
20	92,000	190,000	350,000	625,000
40	63,000	130,000	245,000	445,000
60	50,000	105,000	195,000	365,000
PROPANE GAS				
Length of Pipe (Ft)	Pipe Capacity—Btuh Input Includes Fittings			
	Copper Tubing*		Iron Pipe	
	5/8 in.	3/4 in.	1/2 in.	3/4 in.
20	131,000	216,000	189,000	393,000
40	90,000	145,000	129,000	267,000
60	72,000	121,000	103,000	217,000

* Outside diameter.
The length of pipe or tubing shown should be measured from gas meter or propane second stage regulator.



A95148

Fig. 9—Gas Piping at Boiler

The boiler must be isolated from gas supply piping system by closing its individual manual shutoff valve during any pressure testing of the gas supply piping system at test pressures equal to or less than 0.5 psig (3.5 kPa).

PROCEDURE 2—CONNECTING GAS PIPING

Refer to Fig. 9 for general layout at boiler. It shows the basic fittings needed. The gas line enters boiler from right side.

The following rules apply:

1. Use only those piping materials and joining methods listed as acceptable by the authority having jurisdiction or in the absence of such requirements, by the NFGC ANSI Z223.1-1992. Canadian installations must be installed in accordance with NSCNGPIC and all authorities having jurisdiction.
2. All pipe compound must be resistant to liquified petroleum gas.
3. Install ground joint union in gas supply line between shutoff valve and boiler controls.
4. Install a sediment trap upstream of gas controls.
5. Use 2 pipe wrenches when making connection to gas valve to keep it from turning.
6. Install a manual shutoff valve in vertical pipe about 5 ft above floor.
7. Tighten all joints securely.
8. Propane gas connections should only be made be a licensed propane installer.
9. Two-stage regulation should be used by propane installer.
10. Propane gas piping should be checked out be propane installer.

PROCEDURE 3—CHECKING GAS PIPING

Upon completion of piping, check immediately for gas leaks. Open the manual shutoff valve. Test for leaks by applying soap suds (or a liquid detergent) to each joint. Bubbles forming indicate a leak. CORRECT EVEN THE SMALLEST LEAK AT ONCE.

⚠ WARNING: Never use a match or open flame to test for leaks. Use a soap-and-water solution.

ELECTRICAL WIRING

All electrical work must conform to local codes as well as the National Electrical Code (NEC) ANSI/NFPA-70-1993. For Canadian installations, all electrical connections must be made in accordance with CSA C22.1 Canadian Electrical Code, or authorities having jurisdiction.

See Fig. 10 for unit wiring diagram.

PROCEDURE 1—ELECTRIC POWER SUPPLY

⚠ WARNING: Turn off electric power at fuse box before making any line voltage connections. Follow local electric codes.

Run a separate 120-v circuit from a separate overcurrent protective device in electrical service entrance panel. This should be a 15-amp circuit. Locate a shutoff switch at boiler. It must be turned off during any maintenance. Connect 120-v power supply to aquastat terminals L1 (HOT) and L2.

The boiler, when installed, must be electrically grounded in accordance with the requirements of the authority having jurisdiction, or in the absence of such requirements, with the NEC ANSI/NFPA-70-1993. Run a 14 gage or heavier copper wire from boiler to a grounded connection in service panel or a properly driven and electrically grounded ground rod.

PROCEDURE 2—INSTALLING THERMOSTAT

The thermostat location has an important effect on the operation of boiler system. BE SURE TO FOLLOW INSTRUCTIONS INCLUDED WITH THERMOSTAT.

Locate thermostat about 5 ft above floor on an inside wall. It may be mounted directly on wall or on a vertically mounted outlet box. It should be sensing average room temperature so avoid the following:

DEAD SPOTS:

Behind doors
Corners and alcoves

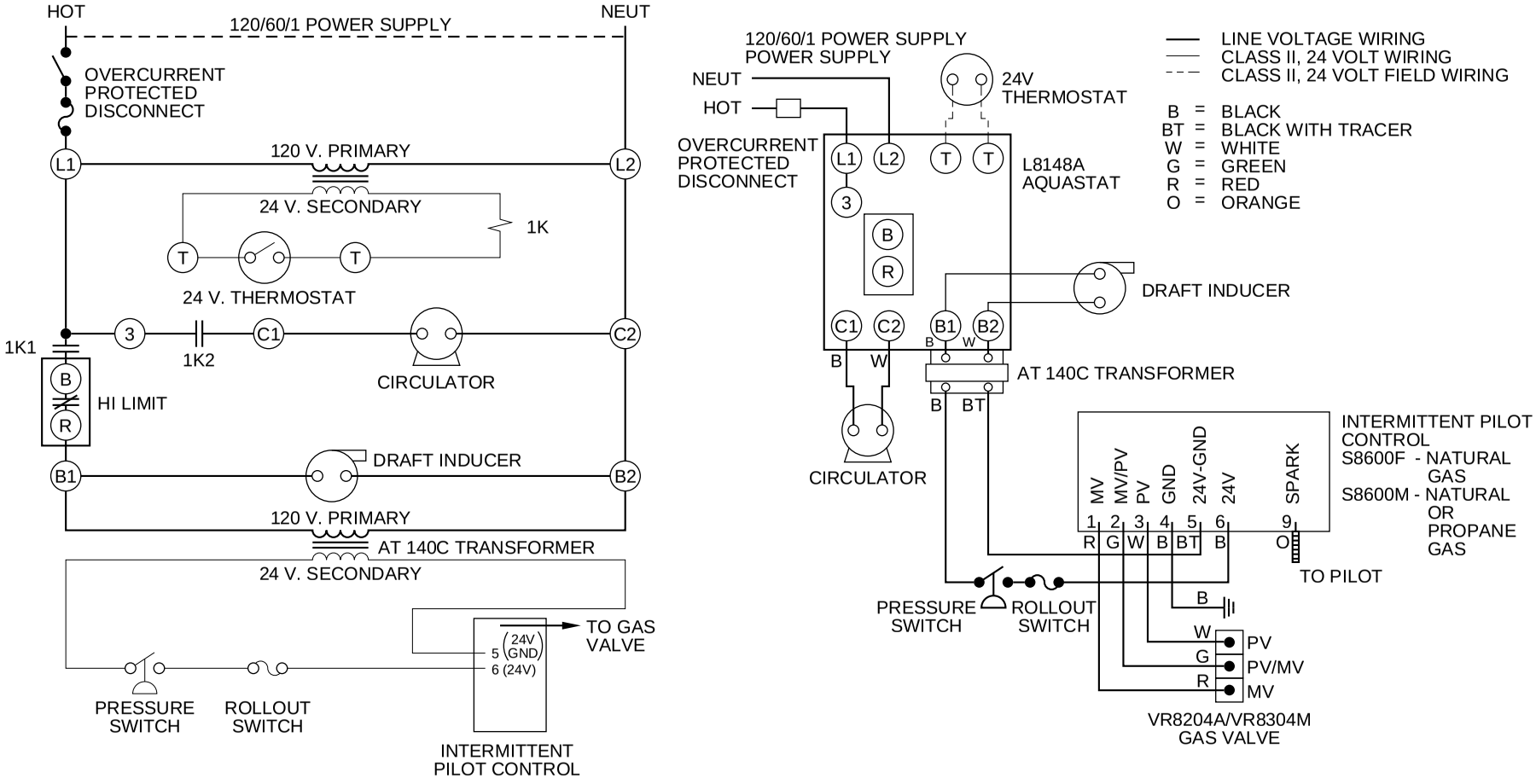
COLD SPOTS:

Concealed pipes or ducts
Stairwells—drafts
Doors—drafts
Unheated rooms on other side of wall

HOT SPOTS:

Concealed pipes
Fireplace
TV sets
Radios
Lamps
Direct sunlight
Kitchens

Set heat anticipator at 0.2 amps. The 24-v thermostat connects to aquastat terminals T and T.



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NOTE: If any of the original wire as supplied with this appliance must be replaced, it must be replaced with type 105°C thermoplastic wire or its equivalent.

Fig. 10—Unit Wiring Diagram

SEQUENCE OF OPERATION

1. Thermostat calls for heat, powering 1K relay coil and closing contacts 1K1 and 1K2.
2. Circulator pump is powered through terminals C1 and C2.
3. Induced draft blower and AT140C transformer primary are powered through terminals B1 and B2.
4. When blower gets up to speed and blower suction pressure reaches pressure switch setpoint, pressure switch contacts close sending 24v to S8600 intermittent pilot control from AT140C transformer secondary.
5. Pilot gas valve opens, and spark initiates to light pilot burner.
6. When pilot flame is proven, spark drops out.
7. Main gas valve opens and pilot burner ignites main burners.
8. If boiler water temperature reaches high limit setpoint, high limit contacts B-R open, cutting power to blower and S8600 intermittent pilot control. Burners extinguish and blower stops. Circulator pump continues to run as long as thermostat continues to call for heat. When boiler water temperature drops past high limit setpoint and through differential, high limit contacts B-R close, repeating items 3 through 7.
9. If venting system becomes blocked, blower suction pressure drops below pressure switch setpoint, opening pressure switch contacts and cutting power to S8600 intermittent pilot control. Burners extinguish, but blower remains powered as long as thermostat continues to call for heat. If venting system clears, items 4 through 7 repeat.
10. Thermostat is satisfied, ending call for heat. Relay coil 1K is de-energized, opening 1K1 and 1K2 contacts. Burners extinguish. Blower and circulator pump stop.

EQUIPMENT AND OPTIONAL ACCESSORIES

PROCEDURE 1—RELIEF VALVE

A relief valve must be installed on boiler. Water expands as it is heated. If there is no place for water to expand into, water pressure builds up inside boiler and system. Should this happen, relief valve automatically opens at a predetermined pressure. This relieves strain on boiler and system. Run a pipe from relief valve outlet (pipe must be same size as outlet, and open end must not be threaded) to an open drain, tub or sink, or other suitable drainage point not subject to freezing. Failure to do so may cause water damage or injury should relief valve release.

PROCEDURE 2—EXPANSION TANK (Optional)

In a properly assembled system, expanding water flows into expansion tank. This tank should be of the correct size.

The tank is filled with air. As the water expands, it compresses the air in tank to form an air pressure cushion. This "spring-like" cushion serves to maintain correct operating water pressure regardless of water temperature. This assures a "full measure" of water even in the highest radiation unit of system. It also prevents blowing off the relief valve.

The air in tank in the beginning (with system filled with cold water) is sufficient for proper operation. The tank also serves as a trap for excess air in system. The air would cause gurgling in pipes and inefficient circulation in radiators if left in system.

It is possible for a tank to become "water-logged" (filled with water). It can also become overfilled with air. This can happen after filling system with new water. Fittings are provided on tank and in line to tank for bleeding off excess water or air.

When installing this tank, the following are important:

1. Tank should be higher than boiler top.
2. Pipe to tank should continuously rise up to tank (so that air can "bubble" up to it).

PROCEDURE 3—DIAPHRAGM-TYPE EXPANSION TANK (Optional)

The diaphragm-type expansion tank (EX-TROL) takes the place of a conventional expansion tank. Read instructions packed with EX-TROL tank assembly carefully.

The EX-TROL tank comes with a 10-12 psi air charge. This is the same as the pressure produced in system by automatic fill valve. When system is first filled, EX-TROL tank contains little or no water.

As water is heated, its pressure increases. It expands into EX-TROL tank compressing the air in tank. This compressed air cushion permits water in system to expand as temperature changes.

PROCEDURE 4—AIR-ELIMINATING FITTING (AIR PURGER) (Optional)

An air purger is used to remove excess air from system. It is installed in supply line. It helps to eliminate air from water before it reaches radiators and bleeds off this air.

PROCEDURE 5—MAIN AIR VENT FOR DOWNFLOW SYSTEMS OR DIAPHRAGM-TYPE EXPANSION TANK (Optional)

Before a system is filled with water, there is air in pipes and radiation units. Some of it will be trapped as system fills. It is possible to eliminate most of this air through air vents on radiation units. A main air vent speeds and simplifies this process. It should be installed on highest point in supply main when all radiation is below top of boiler.

PROCEDURE 6—AUTOMATIC FILL VALVE (Optional)

For safe, efficient operation, a hot water system must be FILLED with water. Adding new water when needed can be done manually (by use of a hand valve in water supply line). This requires regular attention to system’s needs. An automatic fill valve accomplishes this without attention. It is installed in supply line on hot water boilers only. The valve operates through water pressure differentials. It does not require electrical connection.

PROCEDURE 7—DRAIN VALVE

This manual valve provides a means of draining all water from boiler and system. It is often installed in the 3/4-in. tapping at bottom of left boiler section. It can also be installed in a tee where return line enters boiler.

PROCEDURE 8—WATER TEMPERATURE CONTROL

The water temperature limit control in relay is adjustable and may be set as necessary. It may be set as low as 140°F or as high as 240°F. Setting depends on type and amount of radiation involved and weather conditions.

PROCEDURE 9—CIRCULATING PUMP

Every forced hot water system requires a circulating pump. A separate pump or zone valve is required for each zone if there are 2 or more zones. This pump must have the capacity to provide circulation required by system. The pump is connected into return main just ahead of boiler and wired to electrical system.

PROCEDURE 10—BLOWER (DRAFT INDUCER)

The blower provides a means for pulling air through boiler and exhausting flue gases into vent system. The blower shuts off when burners are not firing. This keeps heat in the house rather than losing it up the chimney.

PROCEDURE 11—PRESSURE SWITCH

The air pressure switch works on a negative pressure. When blower comes on, the air pressure switch operates intermittent pilot and gas valve. The air pressure switch is factory set and only works when blower operates properly. It prevents boiler from starting if blower does not generate enough pressure or if venting system is blocked.

The factory-set pressure switch setpoint is as follows:

-0.4 in. wc for 2-5 section boilers

-0.5 in. wc for 6-7 section boilers

PROCEDURE 12—ROLLOUT SWITCH (FLAME ROLLOUT SAFETY SHUTOFF)

The rollout switch is a temperature-sensitive fuse link device. It is located on boiler base just outside fire box. In the event of heat exchanger flueway blockage causing flame to roll out of fire box, the fuse blows shutting down flow of gas to main burners. The fuse does not change in appearance when blown.

If rollout switch blows, it must be replaced with an exact replacement. Check heat exchanger flueways for blockage when restoring system to operating condition. Do not operate system without a rollout switch.

STARTING BOILER

PROCEDURE 1—HOW A HOT WATER SYSTEM OPERATES

The entire heating system (boiler, piping, and radiation units) is filled with water. As water in boiler is heated, it is pumped from top of boiler through supply main to radiation units. The cooler water in them flows back through return main to boiler. This provides positive and rapid response to thermostat.

PROCEDURE 2—FILLING SYSTEM WITH WATER

To fill:

1. Close air vents on all radiation units. Open valves to these units.
2. Make sure boiler and expansion tank drain cocks are closed. The air bleed screw on tank drain fitting should be closed.
3. Open valve in line from boiler to expansion tank. Refer to Maintaining Boiler section for additional information.
4. Open water inlet to boiler and leave it open.
5. Start with LOWEST radiation unit. Open air vent on this unit. When all air has escaped and water starts to flow from vent, close air vent.
6. Proceed to next radiation unit and repeat process outlined in item 5. Repeat until every radiation unit in system has been covered. End with highest unit in system. If units have automatic vents, this manual venting is unnecessary but will speed up proper filling of system.

If system is a closed expansion tank system, there may be an automatic fill valve. It may be left open to refill system automatically as needed. Check temperature-pressure gage. Note position of hand indicating pressure. This should be between 10 and 15 lb. Any lowering of this movable hand below 10 lb indicates loss of water due to leakage. The automatic fill valve should compensate for this. Instructions are packaged with valve.

⚠ WARNING: Never run water into a hot, empty boiler.

⚠ WARNING: If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury, or loss of life.

This appliance is equipped with an ignition device which automatically lights burner. Do NOT try to light burner by hand.

BEFORE OPERATING, smell all around appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

⚠ WARNING: IF YOU SMELL GAS:
- **Do not attempt to operate any appliance; do not touch any electric switch; do not use any phone in your building.**
- **Leave the building immediately and call your gas supplier.**
- **If your gas supplier cannot be reached, call the fire department.**

⚠ WARNING: When turning or depressing gas control knob, use only your hand to push down or turn knob. Never use tools. If knob will not operate by hand, control must be replaced by a qualified service technician. Force or attempted repair may result in a fire or explosion.

⚠ WARNING: If any part of this appliance has been under water, do not operate. Immediately call a qualified service technician to inspect the appliance and to replace any part of gas control system which has been under water.

GAS VALVE OPERATING INSTRUCTIONS

A. To Turn On Gas To Appliance

1. STOP! Read safety information in For Your Safety Read Before Operating section.
2. Set thermostat to lowest setting.
3. Turn off all electrical power to appliance.
4. This appliance is equipped with an ignition device which automatically lights burner. Do NOT try to light burner by hand.
5. Remove burner access panel.
6. Push in gas control knob slightly and turn clockwise to OFF position. (See Fig. 11.)

NOTE: Knob cannot be turned OFF unless knob is depressed slightly. Do not force.

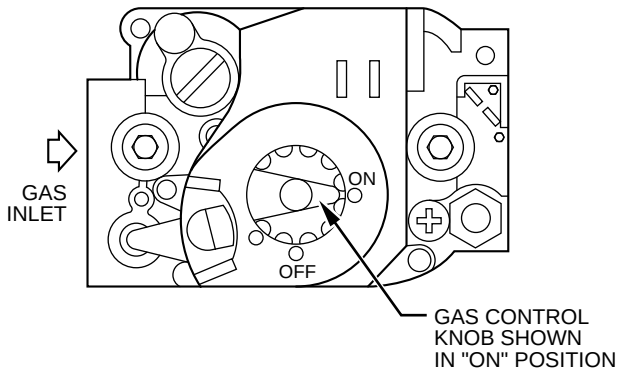

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Fig. 11—Gas Valve

⚠ WARNING: Wait 5 minutes to allow any gas in the combustion chamber to vent. If you then smell gas in appliance area or near the floor, do not touch any electrical switch; do not use the phone. Leave the building immediately and call your gas supplier. If your gas supplier cannot be reached, call the fire department. Failure to do so may result if a fire or explosion. If you do not smell gas, go to the next item.

7. Turn gas control knob counterclockwise to ON position. (See Fig. 11.)
8. Turn on all electrical power to appliance.
9. Set thermostat to desired setting.

10. After visually inspecting flame, replace lower front panel.

⚠ WARNING: If appliance will not operate after several tries, turn gas control knob to OFF position and call your service technician or gas supplier.

B. To Turn Off Gas To Appliance

1. Set thermostat to lowest setting.
2. Turn off all electric power to appliance if service is to be performed.
3. Push in gas control knob slightly and turn clockwise to OFF position. Do not force.

CHECKING AND ADJUSTING

PROCEDURE 1—GAS VALVE SAFETY SHUTDOWN TEST

With main burners firing, disconnect ignition cable from intermittent pilot control box. Gas valve should shut off main burners. TURN OFF ELECTRIC POWER to boiler before reconnecting ignition cable to prevent electric shock.

PROCEDURE 2—PILOT BURNER ADJUSTMENT

Pilot flame should surround 3/8- to 1/2-in. of pilot sensor. (See Fig. 12.) If flame needs adjusting, proceed as follows:

1. Remove screw cover over pilot adjusting screw.
2. Insert small screwdriver and adjust flame as needed. (See Fig. 12.) Turn screw counterclockwise to increase flame and clockwise to decrease flame. (See Fig. 13.)
3. Replace screw cover over pilot adjusting screw.

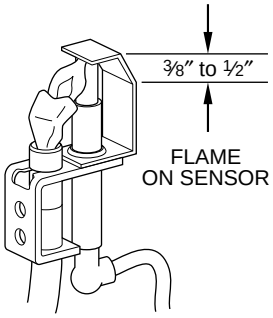

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Fig. 12—Pilot Flame and Sensor

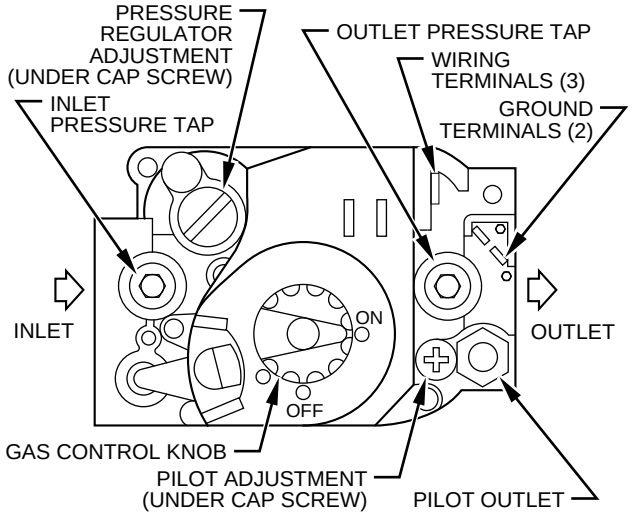

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Fig. 13—Automatic Gas Valve

PROCEDURE 3—MAIN BURNER AIR ADJUSTMENT

The stainless steel main burners do not require primary air adjustment.

PROCEDURE 4—LIMIT CONTROLS ADJUSTMENT

Instructions for each control are included with controls.

Table 3 shows recommended boiler water temperatures. These settings can be changed after becoming familiar with how system works. For example, if system is not giving quite enough heat in very cold weather, the limit setting can be raised to 220°F.

Table 3—Recommended Boiler Water Temperatures

TYPE OF HEATING UNIT	LIMIT CONTROL SETTING
Standing Radiators	180°F
Baseboard and Convector Radiators	200°F

PROCEDURE 5—THERMOSTAT HEAT ANTICIPATOR ADJUSTMENT

Instructions for final adjustment of thermostat are packaged with thermostat.

Set heat anticipator at 0.2.

Check thermostat operation. When set above temperature indicated on thermometer, boiler burners should ignite. Make certain thermostat shuts boiler off when room temperature reaches selected setting and starts boiler operating when room temperature falls a few degrees.

PROCEDURE 6—SAFETY CONTROLS CHECK

After setting limit control to desired setting, check to see if it shuts off gas supply to burners. Turn thermostat to call for heat and let boiler run until temperature of water reaches limit setting. Gas valve should shut off and circulator should keep running until thermostat is satisfied or water cools enough to restart burners through limit control.

To check operation of contacts in pressure switch, disconnect rubber tubing (located between blower and pressure switch) from pressure switch while boiler is operating. The burners should extinguish, and blower should keep running. When tubing is reconnected to pressure switch, ignition sequence should begin, resulting in ignition of main burners.

Finally, set thermostat for desired temperature. Special conditions in home and location of thermostat govern this setting.

Safe lighting and other performance criteria were met with gas manifold and control assembly provided on boiler when boiler underwent tests specified in ANSI Z21.13-latest revision.

MAINTAINING BOILER

PROCEDURE 1—BURNERS

A visual check of pilot and main burner flames should be made at least once each year, preferably at beginning of heating season. See Checking and Adjusting section and Fig. 12, 13, and 14. Main burner flame should form a sharp blue cone with no yellow.

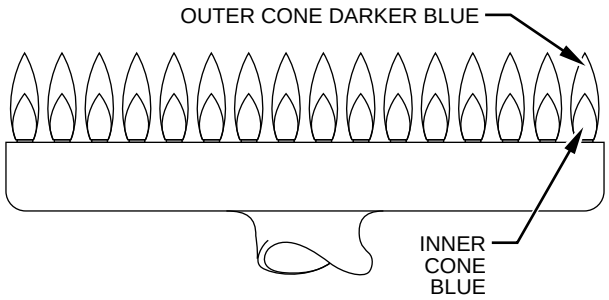

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Fig. 14—Main Burner Flame

PROCEDURE 2—RELIEF VALVE

This valve should open automatically when system pressure exceeds safe limit (30 psi). Should it ever fail to open under this condition, shut down system. Drain it until pressure is reduced below safe limit. Have valve replaced immediately.

PROCEDURE 3—EXPANSION TANK

As previously noted, this tank may become waterlogged or may receive an excess of air. Frequent automatic opening of relief valve indicates waterlogging. A high boiler temperature accompanied by unusually low radiation unit temperature (and "knocking") indicates excess air in tank.

To correct either condition, close valve between boiler and tank. Drain tank until it is empty. Check all tank plugs and fittings. Tighten as necessary. Open valve between boiler and tank. Water will rise to normal height in tank if automatic fill valve is installed, otherwise, manually refill system.

PROCEDURE 4—BOILER FLUE PASSAGES

Under normal operating conditions with burners properly adjusted, it should not be necessary to clean boiler flue gas passages. However, to assure trouble-free operation, we recommend that flue passages, burner adjustment, and operation of controls be checked ONCE EACH YEAR by a competent service technician.

BEFORE THE START OF EACH SEASON (or whenever system has been shut down for some time), recheck whole system for leaks and recheck boiler and vent pipe for leaks. Replace or patch any boiler seals that are faulty.

PROCEDURE 5—VENT PIPE

The venting of this unit is very important. Piping should be checked at least once a month. If vent piping shows any signs of leaking, replace it immediately.

PROCEDURE 6—WATER SYSTEM

If system is to remain out of service during freezing weather, always DRAIN IT completely. Water left in to freeze will crack pipes and/or boiler.

PROCEDURE 7—CLEANING BOILER AND BURNERS

Flue passages between sections should be examined yearly and cleaned if necessary. To clean:

1. Remove burners, pilot, and vent pipe.
2. Remove top and front jacket panels.
3. Split silicone seal on flue collector and cleanout plates with a razor blade.
4. Remove flue collector.
5. Remove cleanout plates by tapping upwards on bottom of plate with a hammer.
6. Remove loose silicone sealant from sections, flue collector, and cleanout plates.
7. Clean passageways between sections with a flexible handle wire brush and a straightened out wire coat hanger. Remove dirt from bottom of boiler and between sections by vacuuming.
8. Make sure all flame ports in burners are open and clear. Shake out or blow out all loose dirt in burners.
9. Reassemble all parts.
10. Seal flue collector and cleanout plates to sections with 400°F RTV silicone sealant or equivalent.
11. Reseal seams between adjacent sections as necessary. All joints MUST be airtight.
12. Be sure to check tightness of pilot connections and condition of burner flames after reassembly. (See Fig. 14.)
13. Be sure vent pipe connections to chimney are secure and no obstructions are present.

PROCEDURE 8—BLOWER

The blower motor features a permanently lubricated ball bearing construction. Lubrication is not required.

SERVICE HINTS

You may avoid inconvenience and service calls by checking these points before you call for service.

FOR YOUR SAFETY
WHAT TO DO IF YOU SMELL GAS

1. **Do not try to light any appliance.**
2. **Do not touch any electric switch; do not use the phone.**
3. **Leave the building immediately, then call your gas supplier.**
4. **If you cannot reach the gas supplier, call the fire department.**

IF SYSTEM IS NOT HEATING OR NOT GIVING ENOUGH HEAT...	
Possible Cause	**What To Do**
Thermostat is not set correctly	Reset thermostat above room temperature.
Burner is not operating properly	Check flame. If it is yellow, burner is not getting enough air. If flame is blue and noisy and seems to lift off the burner, burner is getting too much air. Contact your service technician.
No electric power to boiler	Check overcurrent protection. Check to be sure electric power supply circuit is on.
Controls out of adjustment	Reset according to instructions.
Radiators not heating	Open radiator vents to vent excess air. Check flow control valve (if used). It may be in closed position.
Circulator pump not running	Check overcurrent protection. Check relay operation.
Poor electrical contact	Check all control terminals and wire joints.
Chimney flue is blocked	Pressure switch will not close and pilot spark will not operate to start pilot. Have your service technician check and correct, if necessary.
Rollout switch blown	Have your service technician check heat exchanger for blockage. Replace rollout switch with exact replacement.
IF BURNER IS NOISY...	
Possible Cause	**What To Do**
Gas input amount is incorrect	Contact your service technician.
RELIEF VALVE LEAKING...	
Possible Cause	**What To Do**
Dirt on seat	Open valve manually. Allow water to run and clear valve seat.
Waterlogged expansion tank	Drain tank. See instructions.

HAVE YOUR SERVICE TECHNICIAN CHECK ANY PROBLEM YOU ARE UNABLE TO CORRECT.

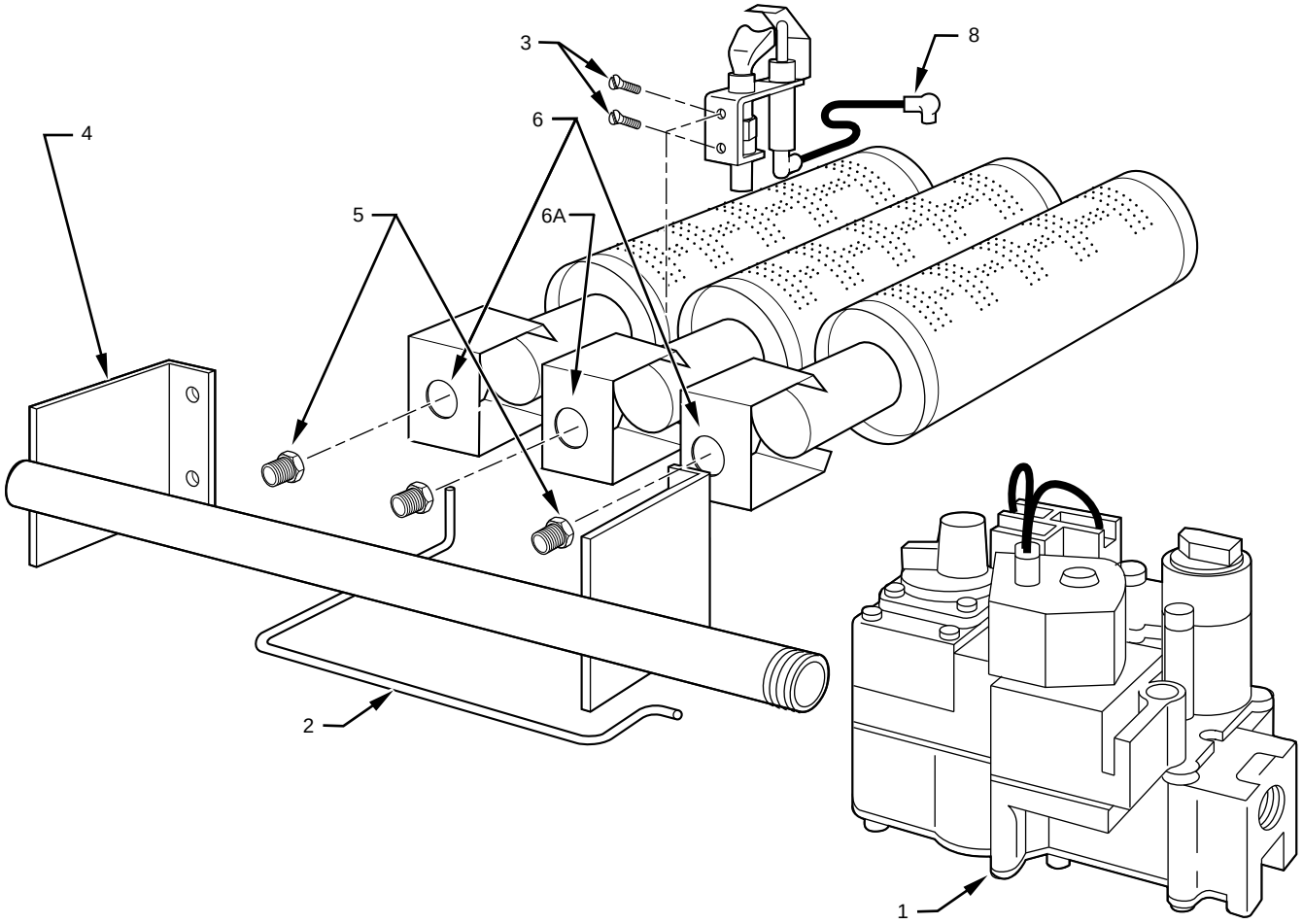
REPAIR PARTS

IMPORTANT — READ THESE INSTRUCTIONS BEFORE ORDERING

All parts listed in the following Parts List may be ordered through your nearest supplier or direct from the factory.

When ordering parts, first obtain the Model No. from the data plate on boiler, then determine the Part No. (not the Key No.) and the Description of each part from the following illustrations and lists. Be sure to give all this information: The Part No. — The Part Description — The Boiler Model No.

FOR USE WITH NATURAL GAS ONLY



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Natural Gas Burners and Manifold Parts

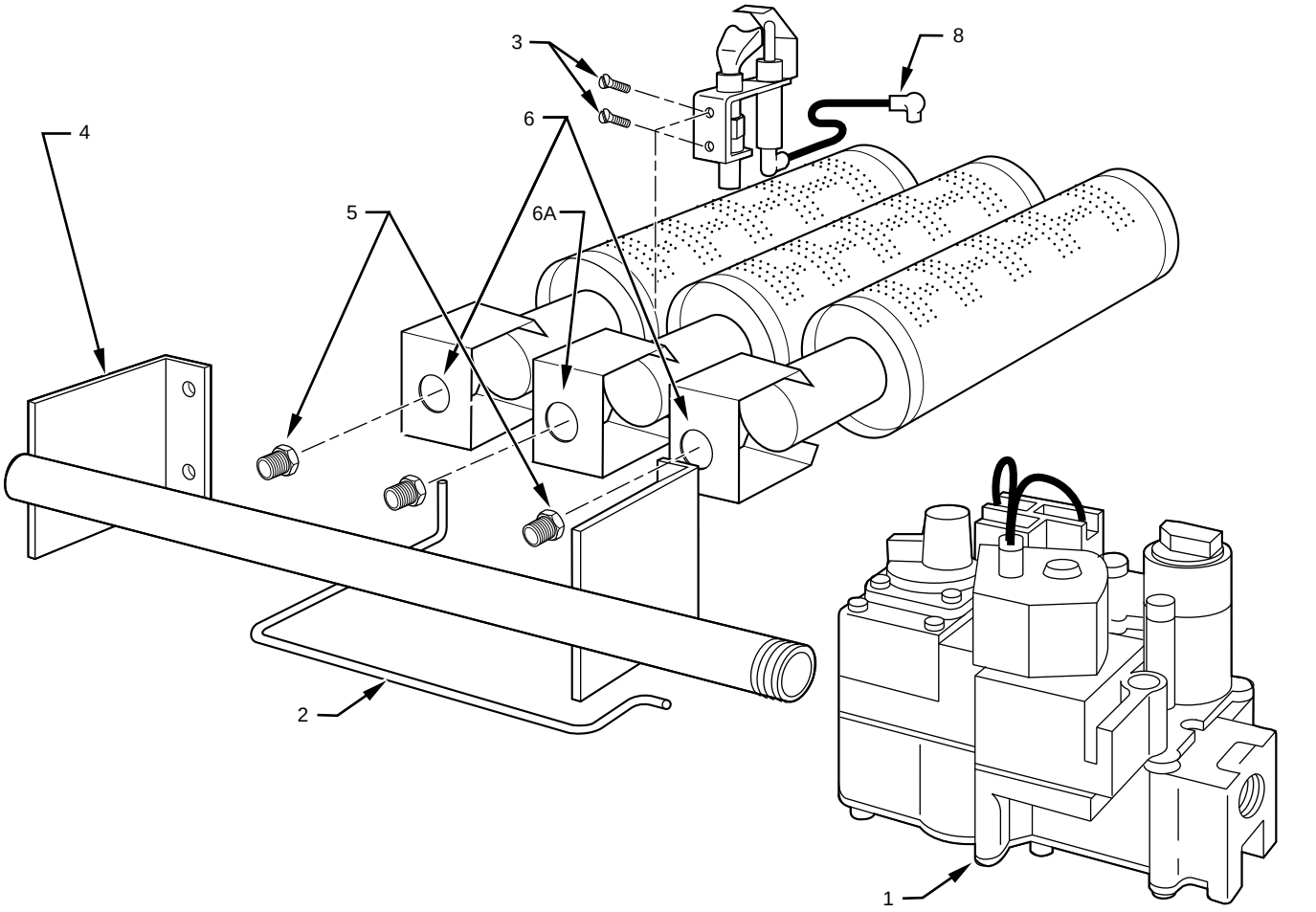
This is a Repair Parts List—Not a Packing List

KEY NO.	DESCRIPTION	PART NO.					
		2 Section	3 Section	4 Section	5 Section	6 Section	7 Section
1	24-v Gas Valve, Natural Gas	146-62-052	146-62-052	146-62-052	146-62-052	146-62-058	146-62-058
2	Pilot Tube	146-15-005	146-15-005	146-15-005	146-15-005	146-15-006	146-15-006
3	10-32 X 3/16-in. Slotted Hex Head Screw (2 required)	146-95-301	146-95-301	146-95-301	146-95-301	146-95-301	146-95-301
4	Gas Manifold	146-16-042	146-16-043	146-16-044	146-16-045	146-16-024	146-16-025
5	Orifice — Natural Gas*	146-15-030	146-15-031	146-15-031	146-15-031	146-15-035	146-15-035
6	Main Burner Less Pilot Bracket†	—	146-15-528	146-15-528	146-15-528	146-15-528	146-15-528
6A	Main Burner with Pilot Bracket	146-15-529	146-15-529	146-15-529	146-15-529	146-15-529	146-15-529
7	Pilot Burner with Orifice, Natural Gas	146-62-040	146-62-301	146-62-301	146-62-301	146-62-301	146-62-301
8	Ignition Cable	146-62-074	146-62-074	146-62-075	146-62-075	146-62-076	146-62-076
‡	Rollout Shield	425-00-932	425-00-933	425-00-934	425-00-935	425-00-936	425-00-937

Quantity is 1 unless otherwise noted.
* Requires 1 less than the number of sections.
† Requires 2 less than the number of sections.
‡ Not illustrated.

REPAIR PARTS

FOR USE WITH PROPANE GAS ONLY



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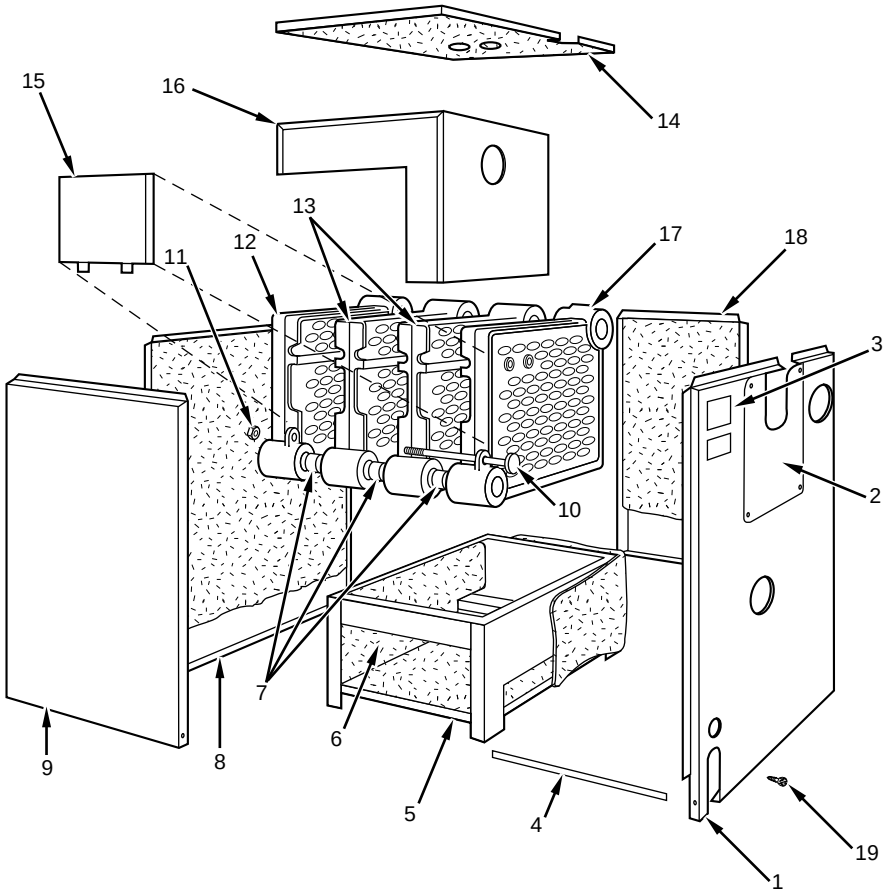
Propane Gas Burners and Manifold Parts

This is a Repair Parts List—Not a Packing List

KEY NO.	DESCRIPTION	PART NO.					
		2 Section	3 Section	4 Section	5 Section	6 Section	7 Section
1	24-v Gas Valve, Propane Gas	146-62-062	146-62-062	146-62-062	146-62-062	146-62-059	146-62-059
2	Pilot Tube	146-15-005	146-15-005	146-15-005	146-15-005	146-15-006	146-15-006
3	10-32 X 3/16-in. Slotted Hex Head Screw (2 required)	146-95-301	146-95-301	146-95-301	146-95-301	146-95-301	146-95-301
4	Gas Manifold	146-16-020	146-16-021	146-16-022	146-16-023	146-16-024	146-16-025
5	Orifice — Propane Gas*	146-15-036	146-15-036	146-15-036	146-15-036	146-15-036	146-15-036
6	Main Burner Less Pilot Bracket†	—	146-15-528	146-15-528	146-15-528	146-15-528	146-15-528
6A	Main Burner with Pilot Bracket	146-15-529	146-15-529	146-15-529	146-15-529	146-15-529	146-15-529
7	Pilot Burner with Orifice, Propane Gas	146-62-038	146-62-056	146-62-056	146-62-056	146-62-056	146-62-056
8	Ignition Cable	146-62-074	146-62-074	146-62-075	146-62-075	146-62-076	146-62-076
‡	Rollout Shield	425-00-932	425-00-933	425-00-934	425-00-935	425-00-936	425-00-937

Quantity is 1 unless otherwise noted.
* Requires 1 less than the number of sections.
† Requires 2 less than the number of sections.
‡ Not illustrated.

REPAIR PARTS



A95202

Jacket—Section and Base Parts

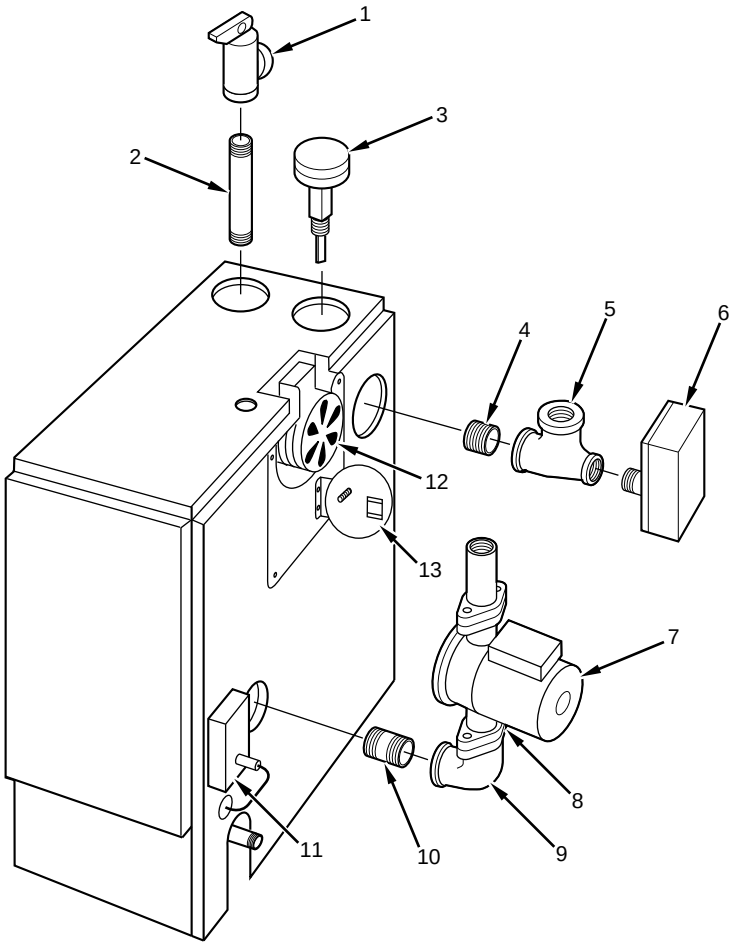
This is a Repair Parts List—Not a Packing List

KEY NO.	DESCRIPTION		PART NO.					
			2 Section	3 Section	4 Section	5 Section	6 Section	7 Section
1	Jacket, Right Side Panel		730-00-1050	730-00-1050	730-00-1050	730-00-1050	730-00-1050	730-00-1050
2	Blower Cover Plate		730-00-1170	730-00-1170	730-00-1170	730-00-1170	730-00-1170	730-00-1170
3	Rating Plate		146-80-005	146-80-005	146-80-005	146-80-005	146-80-005	146-80-005
4	Jacket Tie Bar		425-01-494	425-01-495	425-01-496	425-01-497	425-00-498	425-00-499
5	Boiler Base		425-01-733	425-01-734	425-01-735	425-01-736	425-01-737	425-01-738
6	Base Insulation	Base Side (2 Required)	146-14-020	146-14-020	146-14-020	146-14-020	146-14-020	146-14-020
		Base Front	146-14-112	146-14-113	146-14-114	146-14-115	146-14-116	146-14-117
		Base Rear	146-14-122	146-14-123	146-14-124	146-14-125	146-14-126	146-14-127
7	Nipple, Boiler		433-01-976	433-01-976	433-01-976	433-01-976	433-01-976	433-01-976
8	Jacket, Left Side Panel		730-00-1040	730-00-1040	730-00-1040	730-00-1040	730-00-1040	730-00-1040
9	Jacket, Front Panel		730-00-1032	730-00-1033	730-00-1034	730-00-1035	730-00-1036	730-00-1037
10	1/4-in. Tie Rod (2 Required)		146-05-008	146-05-002	146-05-002	146-05-051	146-05-053	146-05-005
11	Nut and Washer		146-95-041	146-95-041	146-95-041	146-95-041	146-95-041	146-95-041
12	Section, Left End		410-01-019	410-01-019	410-01-019	410-01-019	410-01-019	410-01-019
13	Section, Intermediate		—	410-01-018	410-01-018	410-01-018	410-01-018	410-01-018
14	Jacket, Top Panel		730-00-1012	730-00-1013	730-00-1014	730-00-1015	730-00-1016	730-00-1017
15	Cleanout Plate(s)		425-01-539	425-01-540	425-01-541	425-01-542	(1) 425-01-540 (1) 425-01-541	(2) 425-01-541
16	Flue Collector		730-00-3002	730-00-3003	730-00-3004	730-00-3005	730-00-3006	730-00-3007
17	Section, Right End		410-01-017	410-01-017	410-01-017	410-01-017	410-01-017	410-01-017
18	Jacket, Back Panel		730-00-1022	730-00-1023	730-00-1024	730-00-1025	730-00-1026	730-00-1027
*****	Jacket Complete		730-70-1002	730-70-1003	730-70-1004	730-70-1005	730-70-1006	730-70-1007
19	No. 10 X 1/2-in. Sheet Metal Screw		146-95-074	146-95-074	146-95-074	146-95-074	146-95-074	146-95-074
*****	Block Assembly (Includes 9, 14, 15, 16, 17, 21)		410-01-212	410-01-312	410-01-412	410-01-512	410-01-612	410-01-712
*****	Combustible Floor Base		146-14-031	146-14-031	146-14-031	146-14-031	146-14-032	146-14-032

* Not illustrated.

REPAIR PARTS

BOILER CONTROLS AND PIPING



A95203

KEY NO.	DESCRIPTION		PART NO.
1	3/4-in. ASME Relief Valve		146-22-011
2	3/4-in. X 5-1/2-in. Nipple		146-07-040
3	Temperature-Pressure Gage		146-23-003
4	1-1/4-in. X 5-1/2-in. Nipple		146-07-019
5	1-1/4-in. X 3/4-in. X 1-1/4-in Tee		146-93-049
6	L8148A Combination Hi Limit and Relay Control		146-62-016
7A	Grundfos Pump UP15-42F		146-26-045
7B	Taco Pump 007		146-26-047
8	1-1/4-in. X 2-1/2-in. Nipple		146-07-044
9	1-1/4-in. Ell		146-93-042
10	1-1/4-in X 6-in. Nipple		146-07-017
11	Intermittent Pilot Control — Natural Gas		146-62-303
11	Intermittent Pilot Control — Propane Gas		146-62-071
12	Induced Draft Blower		433-00-511
13	Pressure Switch	2, 3, 4, 5 Section	146-55-006
		6, 7 Section	146-55-005
*	Rubber Tube (Blower to Pressure Switch)		146-29-003
*	Rollout Switch		146-29-002
*	1-1/4-in X 3/4-in. Bushing		146-93-006
*	Grundfos Flange Set		146-26-050
*	Taco Flange Set		146-26-049
*	AT 140C 24-v Transformer		146-62-080
*	1/4-in. Close Nipple		146-07-031
*	1/4-in. Coupling		146-93-054
*	3-in. X 4-in. Increaser Fitting		146-28-012

* Not illustrated.

SERVICE TRAINING

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- Maintenance
- Installation Overview
- Operating Sequence

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